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What Is the Required Level of Noncontingency Temporary Duty for Air Force Personnel?

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*Prepared for the
United States Air Force*

Project AIR FORCE

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PREFACE

The number of Air Force personnel deployed to contingency operations for periods of 30 consecutive days or more rose sharply in 1990 as a result of the Gulf War and has not diminished appreciably since then. The rates of long or hostile deployments for Air Force personnel after the Gulf War are almost two to four times what they were prior to the Gulf War (Hosek and Totten, 1998). In order to alleviate the increased pressure of frequent long deployments on personnel and their families, the Air Force initiated a policy after the Gulf War aimed at limiting temporary duty (TDY) away from home to 120 days in a one-year period.

In addition to TDY for deployments, Air Force personnel also accrue TDY for attendance at training exercises, short-term formal schools, planning workshops and conferences, and other activities associated with the day-to-day operation of the Air Force. Because this TDY is included in the overall limit of 120 days per year, it is important to understand how much TDY is associated with these activities, as distinguished from contingency-related deployments. This question was the focus of this research: How much noncontingency TDY must Air Force personnel perform to support the day-to-day needs of the Air Force?

This research was performed in Project AIR FORCE's Manpower, Personnel, and Training program. The contents of this briefing should be of interest to squadron commanders who must manage the competing demands on the personnel they lead and to Air Force policymakers and staff responsible for personnel policies, plans, and operations.

PROJECT AIR FORCE

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ACRONYMS

ACC	Air Combat Command
AFPC	Air Force Personnel Center
AFSC	Air Force Specialty Code
AMC	Air Mobility Command
JCS	Joint Chiefs of Staff
MAJCOM	Major Command
PACAF	Pacific Air Forces
PID	Plan Identification [number]
SOS	Squadron Officers' School
TDY	Temporary duty
USAFE	United States Air Forces in Europe

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BACKGROUND AND INTRODUCTION

This study was undertaken at the request of Major General Susan Pamerlau, then AF/DPF, who was interested in better understanding the amount of noncontingency temporary duty (TDY) that the Air Force must perform in order to stay trained and ready for its missions.

What Are the Issues?

- **The Air Force has set a “not-to-exceed” target of 120 TDY days per year.**
- **The level of TDY required to maintain training and readiness is unknown.**
- **Therefore, the level of TDY available for contingency operations is also unknown.**

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In order to minimize the potential detrimental effects of increased TDY caused by contingency operations, the Air Force set a “not-to-exceed” target of 120 days of TDY per person in a 365-day period. In addition to TDY for contingency operations, some minimum level of TDY is required for normal Air Force peacetime operations and for individual and unit training that supports readiness, and this TDY is included in the 120-day target. That is to say, members need to attend training courses, exercises, and planning conferences as well as to perform other travel in the normal course of Air Force activities in addition to supporting contingency operations.

Most of these normal TDY requirements cannot be set aside, and the need for them is not diminished when contingency operations increase. Nor do activities performed during contingency operations always serve to replace lost training exercises (Stillion, 1999); in fact, for individuals in some specialty areas, such activities may increase the need for refresher training upon return from contingency operations. Stillion reported finding that air-to-ground and air-to-air skills among fighter pilots declined rapidly during contingency operations. In another report, Mathes (2000) found that the combat readiness of heavy and light U.S. Army combat units was degraded by participation in contingency operations. On the other hand, for individuals in some specialty areas, it is conceivable that contingency operations may actually be substitutable

for other training events. For example, perhaps some security force activities that can be practiced only at home station become normal duty activities during a contingency operation. Nonetheless, the pace of normal duty and training exercises is designed to develop and maintain competence in the full set of skills required by a specialty, whereas contingency operations necessarily focus skills on what is specifically needed for such operations.

In order to manage these competing demands for TDY effectively, the Air Force must first understand the magnitude of normal TDY requirements. Accordingly, the focus of this study is on understanding the magnitude of required noncontingency TDY.

Steps to Address the Issues

- **Identify current noncontingency TDY levels based on Air Force TDY data:**
 - **Examine accuracy of Air Force TDY data.**
 - **Develop a model of errors in TDY records.**
 - **Apply this model to increase accuracy.**
- **Estimate levels of TDY that represent training and squadron commanders).**
- **Infer how much time is available for contingencies.**

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RESEARCH PLAN

The primary objective of this study was to estimate the amount of TDY required to support ongoing noncontingency-related activities. This estimate, together with the 120-day ceiling, will also serve to inform Air Force policymakers about the level of TDY available to support contingency operations.

Although Air Force personnel and financial reporting systems were not designed to systematically accumulate information on the types and amount of TDY performed by individuals, an office at the Air Force Personnel Center (AFPC) derives such information from those systems and captures it in the TDY History File. Our study of TDY used this file as a starting point in our effort to estimate levels of noncontingency TDY. A description of this file and the other major sources of data for this research is included in Appendix A.

Because the accuracy of the data collected by AFPC had not previously been systematically established, one of our first steps was to compare TDY that individuals had actually performed with AFPC's constructed historical records of TDY at one wing. The results of that comparison

suggested that there may be widespread inaccuracies in AFPC's TDY data for individuals. This in turn suggested the need to develop a model of data errors that could be used to increase the accuracy of the database.

Even after correcting for inaccuracies, we had an additional concern that TDY during the period we examined might be biased in favor of contingency operations. That is, we considered it possible—and perhaps even likely—that routine TDY had been “crowded out” by contingency commitments during the time of our study. If this were the case, then recorded levels of noncontingency TDY would underestimate noncontingency TDY requirements. For example, if a Red Flag exercise were canceled because of a requirement to support contingency operations, the true requirement for TDY associated with peacetime exercises would be underestimated in the historical data.

To understand whether contingency operations had indeed crowded out noncontingency TDY, we interviewed more than 40 squadron commanders in the Air Combat Command (ACC), the Air Mobility Command (AMC), the Pacific Air Forces (PACAF), and the United States Air Forces in Europe (USAFE). We asked commanders whether during the time period of our analysis their squadrons had been able to perform the noncontingency TDY that was necessary to support readiness and training (both unit and individual). If commanders responded that their requisite TDY levels had been reduced by contingency operations, we asked them to estimate the kinds and amounts of TDY that their squadrons had missed. Gross estimates of unmet noncontingency TDY requirements were then added to the corrected estimate from the TDY History File.

Correcting for both accuracy and bias allowed us to establish a level of required baseline TDY. This in turn allowed us to infer how much time would be available to support contingency operations while adhering to the policy of at most 120 days' maximum TDY per person per year. The remainder of this briefing provides additional detail about each of the steps described above, followed by the results of our analysis.

Step 1: Evaluate the Accuracy of Air Force TDY Data

- Examine the accuracy of TDY data in AFPC database that spanned February 1, 1998 to July 31, 1999.
- In four large and distinct occupational groups with expected variability in TDY patterns.
 - Aircrews
 - Maintenance
 - Security
 - Personnel

37% of the Air Force is in these occupations—133,810 of 365,131.

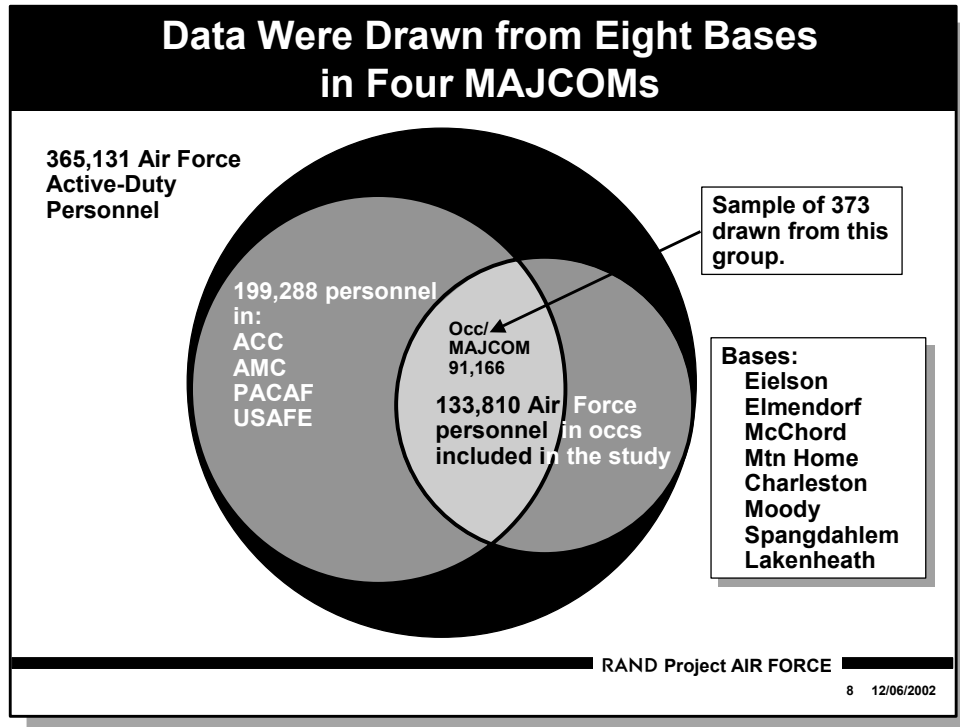
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As noted above, our initial informal assessment of the accuracy of the TDY History File led us to conclude that a more systematic investigation was warranted.

In conducting our evaluation, we focused on TDY that occurred between February 1, 1998, and July 31, 1999. We chose this time period so that trips would be recent enough for personnel to remember but also far enough in the past that they should have been included in the History File (there is a slight lag because trips must be concluded and then reflected in various data sources from which the History File is compiled).

Although we would have liked to include all Air Force occupations and specialties, limited resources precluded this possibility. Instead, we focused on four main occupational groups: aircrews, maintenance, security, and personnel. We chose these groups for three reasons: (1) they are large; (2) they represent important and diverse aspects of the Air Force's many functions; and (3) we expected that their levels of TDY (and potentially the accuracy of their records) would vary significantly. We then designed a strategy to draw a representative sample from those four occupational groups.



The chart above describes the basic characteristics of our sample population. Of the approximately 365,131 active-duty personnel in the Air Force, 133,810 (37 percent) were in the four occupational groups we targeted. We also limited our scope to four major commands (MAJCOMs)—ACC, AMC, PACAF, and USAFE—that together had 199,288 personnel in the occupational groups we targeted. The number of personnel serving in one of those four commands who were also in one of the four occupational groups of interest was 91,166. Of that number, we interviewed and collected data from 373 individuals serving at eight bases: Eielson, Elmendorf, McChord, Mountain Home, Charleston, Moody, Spangdahlem, and Lakenheath.

Method of Examining Accuracy of TDY Data

- The TDY tracking database, which categorizes each TDY as contingency-related, MAJCOM exercise, JCS exercise, or other, was obtained from AFPC.
- The TDY type description variable in the record was used to further identify “school or training” TDY within the “other” category.
- A sample of individuals examined their modified USAF TDY tracking database records for the period February 1, 1998, to July 31, 1999.
- Notations were made on copies of individuals’ records to indicate corrections to dates, categorization of TDY, and missing trips or trips recorded but not actually taken (excess or added trips).

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Our method for examining the accuracy of the TDY History File was straightforward. Each TDY event (trip) in the History File is categorized as one of four types: contingency, MAJCOM exercise, Joint Chiefs of Staff (JCS) exercise, or “other.” These categorizations are made at AFPC on the basis of Plan Identification (PID) numbers that are included on each set of orders and relate to the trip’s funding source.

In some cases, additional information from other sources allowed us to further distinguish among the “other” trips. For example, some “other” trips could be identified as TDY to attend schools or training courses. We integrated this information with the existing TDY History File to yield five categories of TDY: contingency, MAJCOM exercise, JCS exercise, school or training, and “other” (“other” included such things as conferences, trips by maintenance personnel to make aircraft repairs, and the like).

With the purpose of each trip categorized within an individual’s records, we printed out each interviewee’s TDY history for all trips taken between February 1, 1998, and July 31, 1999. The printed document included the dates, length, and purpose of each trip. We asked each respondent to verify his or her record and to make any necessary corrections. In most cases, respondents had been notified about the purpose of our visit and brought vouchers, flight logs, or other confirming information with them

to the interviews. Our interviews allowed us to identify three kinds of errors in the records: (1) a trip was in the History File but information about the trip was incorrect (e.g., wrong dates or purpose); (2) a trip taken was not included in the History File; or (3) a trip in the History File was not taken.

Accuracy Must Be Considered in the Context of How the Data Are Used

- **Characterizations of accuracy depend on how it is defined.**
- **Accuracy can be characterized and reported in the context of individual records:**
 - **Actual numbers of trips or numbers of days TDY can be under- or overrecorded in individual records.**
- **Accuracy can also be characterized and reported in aggregate terms:**
 - **Errors of under- or overreporting of individuals' TDY can balance out in aggregate computations.**
 - **Errors in categorization also can be masked by aggregate reporting.**

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In evaluating the results of our interviews, we realized that characterizing the accuracy of the data depends on how accuracy is defined. Briefly, the data appear to be fairly accurate when examined in the aggregate but less accurate for individuals. (Additional detail is provided later in this document.)

For example, individual records can over- or underreport the number of trips and/or days a person spent TDY. If overreporting occurs for some personnel and underreporting occurs for others, these errors can balance out and result in higher “accuracy” when the data are summarized over a large aggregate of people. The importance of these different kinds of accuracy depends on how the data are to be used. If the purpose is to understand aggregate TDY activity levels, individual discrepancies may not be important. However, if it is important for legal or policy reasons to have a fairly accurate understanding of how often individuals have been away from home, then the accuracy of individual records is paramount. Similarly, if one is interested in modeling the relationship between variables such as TDY and retention, inaccuracies in individual records may take on greater significance.

A Few Facts About TDY from Official Records

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Before we turn to a more detailed description of data accuracy, the next section will briefly describe some basic TDY patterns across the four occupational groups we examined using the unadjusted data in the History File. As noted previously, we collected information on the accuracy of TDY data for the period February 1, 1998, to July 31, 1999. For our analyses, we focused on a one-year subset of that time period, June 1, 1998, to May 31, 1999. First, we sought to maximize the potential for all of the TDY information for our analytic time period to have made it through the system and into the History File. Hence, we set May 31, 1999, as the closing date for the trips we would analyze. Second, we believed that it would be easier for squadron commanders to make judgments about a one-year period of time than about an 18-month period.

Not Everybody Goes TDY, and Those with Contingency TDY Are in a Distinct Minority

Percent of Enlisted Personnel Having TDY					
	Aircrews	Maintenance	Personnel	Security	Total
Contingency	16.4	25.9	7.1	26.1	24.5
Noncontingency	79.6	47.1	28.3	39.5	46.3
Any TDY	80.1	58.3	32.8	56.8	57.6

Percent of Officers Having TDY					
	Aircrews	Maintenance	Personnel	Security	Total
Contingency	34.6	19.8	5.9	9.0	31.2
Noncontingency	94.0	85.7	67.7	84.1	91.6
Any TDY	95.9	88.1	70.1	87.2	93.7

- Only 25% of enlisted personnel and 31% of officers had a contingency TDY recorded for them.
- 42% of enlisted personnel and 6% of officers had no TDY.
- Totals are for the entire Air Force.

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As the chart above illustrates, not everyone goes TDY. Fewer than two-thirds of enlisted personnel had some TDY during the year, while almost all officers (94 percent) had at least one TDY trip. These differences likely stem from the different roles enlisted personnel and officers play, which also appear to vary by occupation and in accordance with the purpose of the TDY. For example, 26 percent of enlisted security forces were found to have gone on a contingency TDY, compared to less than 10 percent of security force officers. In fact, for three of the four occupational groups we examined, a greater proportion of enlisted personnel than officers performed contingency TDY. Only aircrew officers were more likely than their enlisted counterparts to have gone on at least one contingency TDY.

On the other hand, a greater proportion of officers than enlisted personnel performed noncontingency TDY in every occupational group studied.

Although it is not shown in the above chart, for aircrews and security forces there was a slightly negative and statistically significant correlation between the number of days spent on TDY for contingencies and TDY days for other reasons. This suggests that members of occupational groups who spend more time on contingency TDY spend less time on noncontingency TDY.

Per Person, Aircrews Have the Most TDY Trips

Average Number of TDYs for Enlisted Personnel Having Each TDY					
	Aircrews	Maintenance	Personnel	Security	Total
Contingency	1.5	1.2	1.1	1.1	1.2
Noncontingency	8.4	2.1	1.7	2.0	2.6
Any TDY	8.7	2.3	1.7	1.9	2.6

Average Number of TDYs for Officers Having Each TDY					
	Aircrews	Maintenance	Personnel	Security	Total
Contingency	1.5	1.2	1.1	1.3	1.5
Noncontingency	5.9	3.3	2.3	3.0	5.4
Any TDY	6.3	3.4	2.3	3.0	5.8

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The chart above lists the average number of TDY trips for those who took at least one during the year. On average, enlisted aircrews (primarily loadmasters) took significantly more trips than did others (almost nine per person, or nearly 50 percent more than the average for officer aircrews). Across ranks, aircrews averaged two to five more TDY trips than their enlisted or officer counterparts in other occupations.

Categories of TDY Are Not Divided Evenly Among Personnel

- The percent of individuals with *different categories of noncontingency TDY* varies by occupation and whether they are officer or enlisted:
 - 13% of aircrew officers had MAJCOM exercise TDY, but almost no security officers (1%) had MAJCOM exercise TDY.
 - Officers and enlisted aircrews were about twice as likely to have school or other TDY as other enlisted personnel in our sample.

Occupation	MAJCOM Exercises		JCS Exercises		School		Other	
	Enlisted	Officer	Enlisted	Officer	Enlisted	Officer	Enlisted	Officer
Aircrews	6.0	13.4	3.6	5.4	16.6	16.5	90.8	91.6
Maintenance	8.2	7.0	2.5	2.6	8.1	20.2	45.0	77.8
Personnel	1.2	2.0	1.3	1.4	7.6	18.7	25.0	56.2
Security	0.8	0.9	4.4	5.3	10.5	19.3	36.6	73.8

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Personnel in different occupations also had different patterns of noncontingency TDY. For example, approximately one out of seven aircrew officers (13 percent) had participated in a MAJCOM exercise TDY, whereas fewer than one out of 100 security officers (1 percent) had done so.

Officers in all four occupational groups, along with enlisted aircrews, were approximately twice as likely as others to have taken at least one school-related TDY. These groups were also almost twice as likely to have “other” noncontingency TDY trips.

Accuracy of Total Recorded TDY Trips and Days

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The next three sections discuss the accuracy of individuals' records in the TDY History File from three different perspectives. The first section explores overall accuracy in terms of the number of trips and the recorded number of TDY days. The two sections that follow provide additional details on trip and day data broken out by contingency and noncontingency travel, respectively.

The Total Number of TDY Trips in the Database Was Accurate for 79% of Individuals

Percent of Individuals with Accurate Counts of Number of Trips

Aircrews	Maintenance	Personnel	Security	Total
68.5	72.5	90.7	86.6	78.9

(Records were accurate.)

And was least accurate for aircrews and maintainers

- 15% reported *more* actual trips than were recorded for them.
- 6% reported *fewer* actual trips than were recorded for them.
- Errors were most common for aircrews and maintenance.

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The chart above characterizes the overall accuracy of TDY records for the 373 personnel in our sample.

In terms of the number of trips individuals took over the 18-month period we studied, the TDY History File on average accurately captured the true number of trips for almost 79 percent of Air Force personnel. However, this accuracy varied among occupations: Slightly more than two-thirds of aircrews had the right number of trips reflected in the History File, compared to more than 90 percent of personnelists.

For Individuals, Counts of Total TDY Days Were Correct Less Often than Counts of Trips

Percent of Individuals with Varying Degrees of Accuracy in Counts of Days

	Actual Minus Official Days	Aircrews	Maintenance	Personnel	Security	Total
Overreported	Less than -30		0.4	0.3	2.5	0.6
	-16 to 30	0.5	3.3			1.2
	-6 to -15	7.6	2.2	2.1	1.3	3.3
	-2 to -5	2.7	0.7	2.2		1.5
	-1				2.4	0.3
Underreported	0	60.6	63.0	85.4	83.2	71.8
	1	1.6	5.3		1.4	2.4
	2 to 5	2.3	4.6	4.5	0.3	3.5
	6 to 15	16.1	6.9	1.2	6.0	7.1
	16 to 30	3.5	5.1	0.3		2.6
	Greater than 30	5.2	8.6	4.0	3.1	5.7

- Overall, official records of total TDY days were accurate for 72% of personnel.
- Official records were more likely to contain too few than too many days (21% with too few days vs. 7% with too many days recorded).

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There are two sources of error in counts of TDY days in the History File. Some errors in the counts of total TDY days in the History File stem from TDY trips that either were not captured or were included erroneously. Other errors result from the inaccurate recording or categorizing of TDY days per trip.

The chart above shows the accuracy of the History File in recording the true number of TDY days. Overall, the History File was accurate to the day for 72 percent of those we surveyed. Twenty-one percent had been gone longer than was reflected in their records, and 7 percent had been away for less time than the record indicated. Almost 80 percent of all respondents' records were correct within plus or minus five days.

As in counts of trips, accuracy was lowest for aircrews (61 percent) and highest for personnelists (85 percent). Records underreported total TDY for 29 percent of the aircrews in our sample, and the magnitude of the error was at least 16 days for 9 percent. Overreporting was less common: Only 11 percent of aircrews had been away for less time than their records reflected.

Almost 9 percent of the maintenance personnel we surveyed said that they had spent in excess of 30 days more on TDY than was shown in the History File—the highest percentage of all the occupations we sampled.

These discrepancies generally result from the way in which TDY information is recorded and collected but are also related to different distributions of TDY across occupations. We discuss the reasons for these inaccuracies further in the section that follows.

Accuracy of Recorded Contingency TDY

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This section reports data accuracy for TDY that was for contingency purposes only.

The Total Number of Contingency TDY Trips Is Accurate for 89% of Individuals

Percent of Individuals with Accurate Counts of Trips

Aircrews	Maintenance	Personnel	Security	Total
81.1	82.5	97.7	95.4	88.5

And is least accurate for aircrews and maintainers

- 10% reported more actual contingency trips than were recorded.
- 2% reported fewer actual contingency trips than were recorded.
- Errors were most common for aircrews and maintenance.

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Our interviews showed that on average, the TDY History File accurately captured the true number of contingency trips for 89 percent of Air Force personnel. However, this accuracy varied among occupations: About 81 percent of aircrews had the right number of contingency trips reflected in the History File, compared to almost 98 percent of personnelists.

For Individuals, Counts of Contingency TDY Days Were Correct Less Often than Counts of Trips

Percent of Individuals with Varying Degrees of Accuracy in Counts of Days

	Actual Minus Official Days	Aircrews	Maintenance	Personnel	Security	Total
Overreported	Less than -30		0.4		0.4	0.2
	-16 to -30		2.7			0.9
	-6 to -15	0.5	1.2			0.5
	-2 to -5	0.3	0.3			0.2
	-1			0.7		0.2
	0	74.7	80.0	96.5	93.7	85.6
Underreported	1		1.5			0.5
	2 to 5	2.6				0.6
	6 to 15	9.6	4.5	0.2	0.7	3.9
	16 to 30	1.9	0.6			0.6
	Greater than 30	10.4	8.8	2.7	5.2	6.8

- Overall, official records of total TDY were accurate for 86% of personnel.
- Official records were more likely to contain too few than too many days (12% with too few days vs. 2% with too many days recorded).

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As before, errors in the total number of days away from home result not only from errors in the number of days reported and captured for each contingency trip but also from errors in capturing contingency TDY trips. That is, if a trip is not recorded as a contingency TDY, then the count of total contingency TDY days will also be inaccurate.

Overall, 86 percent of those we surveyed had in fact spent the same number of days deployed to contingency operations as was indicated in their records. Twelve percent had been gone longer than the History File indicated in their records, while 2 percent had been away for less time.

Again, accuracy was lowest for aircrews (75 percent) and highest for personnelists (97 percent). For 10 percent of aircrews, records underreported contingency TDY by more than 30 days. Overreporting was more rare: fewer than 1 percent of aircrews had been away for less time than their records reflected.

Maintenance personnel also had a high incidence of underreporting: More than 15 percent had spent more days away from home for contingencies than their records reflected. And while overreporting was rare for security personnel (0.4 percent), the errors that did occur were large (omissions of 30 days or more).

Accuracy of Recorded Noncontingency TDY

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This section provides similar information on the accuracy of noncontingency TDY.

The Total Number of Noncontingency TDY Trips Is Accurate for 76% of Individuals

Percent of Individuals with Accurate Counts of Trips

Aircrews	Maintenance	Personnel	Security	Total
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And is least accurate for aircrews and maintainers

58.8	69.6	91.2	86.6	75.9
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- 13% reported more actual noncontingency trips than were recorded.
- 11% reported fewer actual noncontingency trips than were recorded
- Errors were most common for aircrews and maintenance.

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In terms of the number of trips a given individual took in our 18-month window, the TDY History File accurately captured the true number of noncontingency trips for about 76 percent of our respondents. Again, however, this accuracy varied by occupation: Slightly fewer than 60 percent of aircrews were likely to have the correct number of noncontingency trips reflected in the History File, compared to more than 90 percent of personnelists.

For Individuals, Counts of Noncontingency TDY Days Were Correct Less Often than Counts of Trips

Percent of Individuals with Varying Degrees of Accuracy in Counts of Days

	Actual Minus Official Days	Aircrews	Maintenance	Personnel	Security	Total
Overreported	Less than -30	7.9	2.8	1.7	5.0	3.9
	-16 to -30	3.1	0.4			0.9
	-6 to -15	11.1	3.8	2.1	0.6	4.5
	-2 to -5	3.8	3.1	2.2		2.6
	-1				2.4	0.3
Underreported	0	52.7	64.5	85.9	84.0	70.9
	1	1.9	3.8		1.4	1.9
	2 to 5	1.9	2.8	4.5	0.0	2.8
	6 to 15	12.8	8.2	0.3	6.0	6.6
	16 to 30	2.1	6.8	0.7	0.7	3.0
	Greater than 30	2.6	3.7	2.7		2.7

- Overall, official records of noncontingency TDY days were accurate for 71% of personnel.
- Official records were more likely to contain too few than too many days (17% with too few days vs. 12% with too many days recorded).

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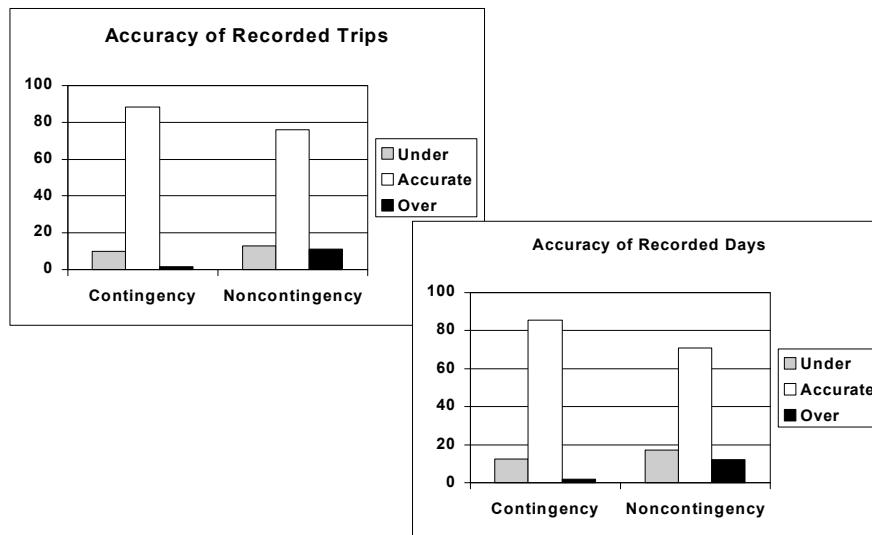
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In terms of the number of days that were recorded as noncontingency TDY, the records for 71 percent of those we surveyed were correct. Seventeen percent had been gone longer than was reflected in their records, and 12 percent had been away for less time than their records indicated.

Again, accuracy was lowest for aircrews (53 percent) and highest for personnel (86 percent). For aircrews, the records for almost 18 percent underreported their noncontingency TDY by a week or more.

Maintenance personnel also had a high incidence of underreporting: Almost 19 percent had spent at least six more days away from home than their records reflected.

Contingency TDY Is More Accurately Recorded than Noncontingency TDY



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To summarize the information presented above, individual records in the History File were more accurate for TDY taken for contingency purposes than for other reasons. The History File reflected more trips than were actually taken for some individuals and fewer trips for others. The graphs above show that these two kinds of errors occur with approximately equal probability for noncontingency TDY. On the other hand, data on contingency trips, when in error, were almost always underreported.

At least some of this error in contingency records is attributable to miscategorization as opposed to complete omission from official records. This miscategorization occurs because the only way AFPC can identify a contingency-related trip is if a known PID is included on the order. There is a variety of reasons some PIDs may be missing. For example, one squadron we visited routinely generated its own travel orders, bypassing the military personnel flight where the PID would have been added. In this instance, the TDY was therefore categorized as "other" in the TDY History File.

Accuracy of Aggregate TDY Recording for Noncontingency and Contingency TDY

- There were 13,012 noncontingency TDY days recorded for our sample of interviewees between June 1, 1998, and May 31, 1999.
- Interviewees reported a total of 12,008 days.
- Overrecording was more common than underrecording.
- In aggregate, noncontingency TDY days were overrecorded by 8.4%.

- There were 11,459 contingency TDY days recorded for our sample of interviewees between June 1, 1998, and May 31, 1999.
- Interviewees reported a total of 14,198 contingency TDY days.
- Underrecording was considerably more common than overrecording.
- In aggregate, total contingency TDY days were underrecorded by 19.9%.

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As was noted earlier, many of the discrepancies we identified may balance out in the aggregate. Indeed, the individuals we interviewed reported having spent 12,008 noncontingency TDY days; the History File included 13,012, or 8.4 percent more. For contingency TDY, the History File captured 11,459 of the 14,198 days actually spent, or 81 percent. (Again, lower accuracy for contingency TDY is partially attributable to miscategorization due to missing or inaccurate PIDs.)

Accuracy of Aggregate TDY Recording for Total TDY Days

- There were 24,471 total TDY days recorded for our sample of interviewees between June 1, 1998, and May 31, 1999.
- Interviewees reported a total of 26,206 days.
- Underrecording was slightly more common than overrecording.
- In aggregate, total TDY days were underrecorded by 6.6%.

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As was noted earlier, many of the discrepancies we identified may balance out in the aggregate. Indeed, the individuals we interviewed reported having spent 26,206 collective days TDY; the History File included 24,471, or 93 percent. Fifty-four percent of these errors can be attributed to miscategorizations of TDY, and 46 percent can be attributed to missing data.

Accuracy of TDY Records for Individuals

- **Accuracy for individuals is moderate:**
 - The probability that an individual's record will be accurate within five days is about 80%.
 - The probability that an individual's record of contingency days will be accurate within five days is about 86%.
- **Accuracy in terms of total days is high—in the aggregate, 93% of all TDY days are recorded.**
- **Accuracy of total contingency days is moderate, largely as the result of difficulties in obtaining correct categorizations of TDY as contingency TDY.**

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Inaccuracies in the TDY History File resulted from a number of kinds of errors in the reporting and tabulating system. It is important to note that the various reporting systems that were in place at the time of this study were not intended to support the centralized collection and analysis of TDY data. Instead, the systems were designed to meet accounting requirements to properly charge and reimburse individuals for their TDY. Only one accounting error in one record was brought to our attention amid all the errors we found in the TDY History File.

The severity of TDY undercounts that we uncovered in the TDY History File stems from the fact that some TDY records were either missing from the TDY History File or miscategorized. First, we discuss the reasons TDY data were missing from the History File.

We identified two major causes of missing TDY data. First, in order to create the TDY History File, every month one person in each of more than 200 finance offices around the world has the responsibility to send an extract of finance records to AFPC. Finance offices do not maintain the information AFPC needs to track TDY beyond one month. We were told of cases in which the person responsible for sending the data was transferred or on leave and a month or more of data was destroyed without being sent. This kind of error results primarily from attempts to use a system for purposes other than those for which it was designed. The

system was not designed to automatically extract and send the data AFPC needed, relying instead on individual intervention.

The second reason data were missing resulted from difficulty keeping up with changes in data coding. A new TDY code had been added to the finance data, and AFPC was unaware of the change. As a result, AFPC filtered out a number of TDY records as irrelevant until the coding change was noted and AFPC's data processing system for TDY tracking was modified.

Undercounts also stem from inaccuracies in categorizing TDY data. There are only two sources of information on the purpose of TDY as far as electronic records are concerned. First, if the TDY is for a "named" operation (e.g., contingency operation), an approved PID is supposed to appear on the TDY record. This PID is put in the record when the travel order is generated for the TDY. If this PID is inaccurate or missing from the record, the TDY cannot be electronically identified as a contingency TDY. Under the circumstances, the TDY would be counted inappropriately as "other." There are multiple ways in which this error can occur; we uncovered both errors of omission and errors of commission.

The other source of information for categorizing TDY comes from duty-status records in the personnel system. This system relies on a squadron clerk to keep duty-status records up to date on a daily basis. This had not been a priority in Air Force squadrons, and as a result, duty-status records might show a person present for duty when in fact he or she was away on TDY. Because a TDY record is generated in any case, it cannot be accurately categorized and is listed as "other."

As a result of the above errors in the system, there is a rather severe undercount of contingency TDY in the History File: Almost 7 percent of individuals' records show undercounts on the order of 30 days or more for contingency TDY. However, AFPC personnel responsible for the TDY History File were present throughout our visits and spent the bulk of their time trying to understand the sources of error in their system. Although we cannot determine the results of their efforts to improve the reporting system without a similar field-based examination of the accuracy of TDY records, their intentions were to make adjustments and improvements with the knowledge they had gained.

In sum, our investigation into the accuracy of the Air Force's TDY History File produced both good and bad news. The good news is that reports of the aggregate number of days spent away from home appear to be quite

close to reality. The bad news is that this reliability breaks down with respect to both correctly reporting days of TDY at the individual level and accurately capturing the purpose of a given trip. Further good news, however, can be found in the fact that for purposes of estimating a baseline level of noncontingency TDY, knowledge of those limitations allows us to develop correction factors to account for inaccuracies. The remainder of our analysis will rely on the corrected values.

Consequences of TDY Errors

- **Inaccuracy of individual records is most consequential:**
 - **Behavioral models that predict outcomes such as retention from inaccurate TDY may underestimate the effects of TDY.**
- **Estimates of levels of TDY for *specific subgroups* (e.g., security or aircrews, specific squadrons) and *specific kinds of TDY* are subject to nontrivial error.**
- **Estimates of *force-wide* overall TDY levels are reasonably accurate.**

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Before proceeding, it is worth noting that the findings reported here concerning the accuracy of the History File may have implications beyond the scope of this analysis. At least two such implications warrant mention. First, if TDY data from the History File are used in behavioral models such as those predicting retention, the effects of TDY may be underestimated because on some occasions errors in independent variables can bias coefficients toward zero. On the other hand, the effect of TDY on retention may depend primarily on the amount of contingency TDY or on the total number of trips, both of which are relatively well measured. Regression analyses comparing the effects of actual versus recorded TDY on reenlistment would clarify the importance of these errors in behavioral models. Second, because errors in the History File were not random with regard to subgroups (e.g., occupational groups) or types of TDY, some reports of TDY will contain nontrivial error. For example, counts of contingency TDY days for aircrews and maintainers based on the History File significantly underestimate the contingency TDY for these groups. Given current and expected use of the data contained in the History File for a wide range of policy decisions, the Air Force may wish to evaluate the implications of lower reliability at the individual level. Despite these cautions, the correction factors we estimated allow us to make use of the TDY History File to respond to the specific question posed for this study.

Step 2: Develop a Model of Errors in TDY Records

- If consistent patterns of errors in TDY records can be identified, then they can be reliably modeled.
- Such modeling leads to correction factors that may ameliorate the consequences of inaccuracy.
- However, the patterns of error identified with this sample of TDY records may easily vary from year to year as missions and reporting methods change.
- In particular, patterns of error identified during this study will aid AFPC in reducing future errors.

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After using our sample data to derive an understanding of the patterns of error in the TDY History File, we developed a model to more accurately estimate actual TDY levels. The details of this model are contained in Appendix B. The correction factors we estimated for this study are, of course, specific to the errors that occurred over the time period of the study and hence cannot be routinely used to ameliorate future errors that may occur in the History File. Given the presence of AFPC personnel during our interviews, however, it can be hoped that the sources of error we identified will be corrected through changes in policies and practices. (It also remains possible that continually evolving missions and data systems will persist in introducing new sources of error into the Air Force's ability to accurately track TDY.)

Analysis of Corrected Data

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The next few charts illustrate the differences between the data recorded in the History File and our adjusted estimates of true TDY levels.

Contingency TDY Days Underrecorded by 20-40% for Five of Eight Subgroups

Recorded Average Contingency TDY Days					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	11	17	5	25	17
Officer	20	11	4	7	18

Adjusted Average Contingency TDY Days					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	*18 ↑	24 ↑	7 ↑	32 ↑	24 ↑
Officer	27 ↑	11	4	*8 ↑	24 ↑

*Small sample sizes result in larger margins of error in these estimates.

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The chart above illustrates some of the results of adjusting the data in the History File using the model described in Appendix B. The table at the top of the chart lists the average number of contingency TDY days from the unadjusted History File. The table on the bottom lists adjusted averages along with an arrow indicating whether the new average is higher or lower than the original data.

Note that the unadjusted History File shows an average of 20 contingency TDY days for officer aircrews. Correcting for inaccuracies, we estimate that the correct average for this group was 27 days. Similarly, enlisted security forces averaged 25 contingency TDY days in the History File; we estimate that the correct average was 32 days. In two cases (enlisted aircrews and security force officers), the margin of error in our estimates is larger than that for other groups owing to small sample sizes.

Errors in Noncontingency TDY Are Smaller

Recorded Average Noncontingency TDY Days					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	65	16	7	13	17
Officer	48	30	18	30	45

Adjusted Average Noncontingency TDY Days					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	*61 ↓	18 ↑	7	12 ↓	19 ↑
Officer	45 ↓	31 ↑	16 ↓	*29 ↓	42 ↓

*Small sample sizes result in larger margins of error in these estimates.

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The chart above displays the same information for noncontingency TDY; adjustments for these trips were smaller than those for contingency TDY. In several cases, we estimate that on average, noncontingency TDY days were overcounted in the History File. This is most likely the result of errors in categorizing contingency TDY, as noted earlier.

Note also the somewhat larger amounts of noncontingency TDY recorded for aircrews. Enlisted aircrews sustain larger amounts of noncontingency TDY because of their assignments as loadmasters in cargo aircraft, which basically provide a supply chain for U.S. forces and embassies around the world. Officer aircrews sustain larger amounts of noncontingency TDY primarily in two activities: ferrying aircraft from one location to another, and traveling to air-to-air and air-to-ground training facilities distant from their home stations.

Total TDY Days Underrecorded by 10-20% for Four of Eight Subgroups

Recorded Average Total TDY Days					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	75	33	12	38	34
Officer	68	40	22	37	62

Adjusted Average Total TDY Days					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	*78 ↑	41 ↑	14 ↑	42 ↑	41 ↑
Officer	72 ↑	42 ↑	22	*34 ↓	66 ↑

*Small sample sizes result in larger margins of error in these estimates.

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The chart above shows the effects of our correction factors on total TDY. For example, we estimate that on average, enlisted personnel performed seven days more TDY than the History File shows. Security officers, on the other hand, spent three days less time away from home than was indicated in the History File.

Small Errors May Exist in Percent of Individuals with Total TDY > 120 Days

Recorded Percent of Individuals with Total TDY > 120 days					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	18	5	2	14	6
Officer	17	5	2	4	14

Adjusted Percent of Individuals with Total TDY > 120 days					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	*18	6 ↑	2	15 ↑	7 ↑
Officer	17	5	2	*3 ↓	15 ↑

*Small sample sizes result in larger margins of error in these estimates.

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Because of the Air Force's specific interest in limiting TDY to no more than 120 days per person per year, we also produced adjusted estimates for the total percentage of individuals who exceeded the target during 1998–1999. Our adjusted estimates show a small increase (1 percent for both officers and enlisted) in the percentage of people with TDY exceeding 120 days in our four occupational groups.*

*Later in this briefing we discuss shortfalls in the types and amounts of TDY that squadron commanders reported were important to maintaining readiness. If the shortfalls in TDY were made up, the numbers of individuals with more than 120 days of total TDY in a year would likely be slightly higher than reported above.

Squadron Commanders' Interviews

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No objective comprehensive sources exist to identify what the “required” levels of noncontingency TDY are. Rather, judgment is the basis for defining every TDY requirement—and in this sense, every TDY event in the History File was a “required” TDY. However, we were not confident in simply using the data from the adjusted History File to represent “required” noncontingency TDY because we were concerned that the pressures to support contingency operations might have driven out noncontingency TDY and caused the required levels of noncontingency TDY to be underrepresented. Nonetheless, our strategy was to begin with the adjusted History File as an estimate of “required” noncontingency TDY and to make further adjustments where necessary to compensate for its potential underrepresentation.

During the early stages of this research, we interviewed MAJCOM and headquarters career field managers, squadron commanders, and others in the personnel, education, and training communities about how best to sort out TDY requirements. From these early interviews, it became apparent to us that squadron commanders were both the most knowledgeable and the most comfortable making judgments about TDY requirements.

This section describes our findings on this issue based on our interviews with squadron commanders. The focus of these interviews was on

whether each squadron's aggregated TDY data, as recorded in the History File, accurately reflected required levels of noncontingency TDY.

Interviewed 49 Squadron Commanders

Was the amount of TDY during the last 12 months sufficient to maintain readiness? If not, what additional TDY is needed?

Was TDY for required unit and individual training and development reduced?

Have contingency operations affected your squadron's ability to perform its mission? How?

Flying Squadrons:

Fighter – 12

Bomber – 1

Airlift – 8

Air Refueling – 1

Air Rescue – 1

Airborne Air Control - 1

Mission Support Squadrons – 7

Security Force Squadrons – 7

Maintenance Squadrons – 9

Air Control – 1

Communications - 1

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Description of the Interviews

We interviewed 49 commanders of the squadrons from which our sample of 373 was drawn. After describing the purpose of the interview, we shared with the commanders summary records of the TDY experience of their squadrons during the immediately preceding 12-month period. We summarized the data by pay grade, reasoning that TDY requirements might be loosely tied to pay grade. We used four groupings of pay grade: field-grade officers, company-grade officers, E-5 and above, and E-4 and below. For each type of TDY, the summaries listed how many people went TDY, the average number of TDY trips per traveler, the average total TDY days per traveler, and the average length of each TDY. We did not identify individual travelers in the summary information we shared with the commanders.

We began the interviews by reviewing in detail the summaries of the squadrons' TDY experience for the past year. Next, for each pay-grade grouping, we asked the commanders to comment on whether the amount of TDY that had been performed met their standard of what was required to maintain readiness. If the commanders answered "no," we asked them to describe the additional TDY that was needed as well as the reasons it was needed. Finally, we asked the commanders to describe why required

TDY had been canceled or postponed and if any TDY had been canceled or postponed because of contingency operations.

More than Half of Squadron Commanders Felt Noncontingency TDY Levels Were Too Low

- Eleven of twelve fighter squadron commanders reported that their pilots were short at least one exercise per year, primarily Red Flag.
- About half of airlift squadron commanders reported shortfalls in SOS and/or in enlisted aircrew training.
- About half of security force squadron commanders noted shortfalls in unit-level exercises or field training.
- Maintenance squadron commanders reported problems associated with meeting skill training requirements, primarily among younger airmen.
- Essentially no TDY shortages were reported by mission support squadron commanders.

SOS = Squadron Officers' School.

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Interview Results

In almost every case in the course of reviewing summary information, squadron commanders spoke knowingly about the purpose of each TDY a member of their squadron had performed and about the individuals who had performed it.

All but the mission support squadron commanders noted that some "required" TDYs had been missed as a result of contingency operations. Overall, however, almost no required noncontingency TDY had been canceled or postponed as a direct result of contingency operations. The most common reasons given for canceled or postponed TDY were either budgetary or related to the indirect effects of contingency operations.

The most notable exception was that almost all fighter squadron commanders stated that their squadrons had missed at least one critical exercise during the past year, usually a Red Flag exercise. Commanders attributed these missed exercises at least in part to the increased pace of contingency operations. In addition to other costs associated with a Red Flag exercise, the squadrons would typically need two additional weeks of TDY to support it.

The major impact of contingency operations was to disrupt normal work and training at the squadron's home station. Security force commanders reported a domino-like effect from contingency deployments. Smaller numbers of personnel left behind at home stations struggled to sustain normal base security.

One security squadron commander noted that he was able to meet base security requirements only because of augmentees from a maintenance squadron. Additionally, because security squadrons were stretched thin meeting base security and contingency operation requirements, they found it difficult or impossible to marshal enough security force personnel with whom to hold normal annual field training exercises.

In examining the comments of squadron commanders, we looked for common threads that would be more widely applicable than small suggested changes in TDY requirements that would have affected few individuals in a squadron. Mission support squadrons perform very little TDY, and their commanders reported no shortages in noncontingency TDY. Maintenance squadron commanders reported problems with individual training for inexperienced maintainers that were an indirect result of contingency operations, but they did not suggest that more noncontingency TDY was required to address that problem. Only flying and security force squadron commanders were consistent in noting shortages in noncontingency TDY for large numbers of personnel in their squadrons. In the end, our analysis of the interviews suggested that noncontingency TDY requirements should be adjusted upward from the TDY History File in the following amounts:

- One week to address individual training shortfalls for enlisted airmen (loadmaster training);
- Two weeks to accommodate officer aircrew training (primarily Red Flag); and
- Two weeks for security force enlisted airmen to accommodate an annual field training exercise.

Several Groups Already Have Limited Time in a 120-Day TDY Ceiling to Contribute to Contingency Operations

Current TDY Days Available for Contingencies					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	59**	102	113	108	101
Officer	75**	89**	104	91*	78

Adjusted Average TDY Days Available for Contingencies					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	52**	102	113	94*	99
Officer	61**	89**	104	91*	67

*Slightly more than 90 days available for contingencies.

**Less than 90 days available for contingencies.

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The chart above reflects the addition of commanders' adjustments to the adjusted History File and the effects these changes have on contingency TDY days available under a 120-day total TDY ceiling. The top table shows the number of TDY days available for contingencies within a 120-day ceiling under current prevailing rates of TDY. For example, enlisted aircrews have only 59 days available to support contingencies.

The bottom table estimates the number of days available for contingency TDY within a ceiling of 120 days' total TDY per year that would be needed if additional noncontingency TDY, as judged needed by squadron commanders, were added.

We estimate that enlisted aircrew members need an average of approximately 68 days of TDY per year devoted to noncontingency-related activities (commanders judged that enlisted aircrew needed an additional seven days of noncontingency TDY during the year). For aircrew officers, the number is approximately 59 days. For enlisted security force personnel, the number is approximately 26 days. These increases are approximately one week for enlisted aircrews and two weeks for enlisted security forces and officer aircrews.

It is interesting to note that under the scenario of a 120-day annual TDY ceiling, three groups already have fewer than 90 days per year available

for contingencies. This situation worsens when commanders' estimates of required noncontingency TDY is added. For example, security and maintenance personnel have barely 90 days to contribute to contingency operations. These results call into question the wisdom of trying to maintain a ceiling of 120 TDY days per year. Other adjustments could be considered, such as limiting TDY to 140 TDY days per 450 days or raising the number of personnel in specialties especially hard-hit by operating tempo increases, such as aircrew, maintenance, and security personnel.

Several Groups Already Have Limited Time in a 120-Day TDY Ceiling to Contribute to Contingency Operations

For those with at least five days noncontingency TDY:

Current TDY Days Available for Contingencies					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	54**	96	98	92*	93
Officer	74**	89**	93*	88**	76

Adjusted Average TDY Days Available for Contingencies					
	Aircrews	Maintenance	Personnel	Security	Total
Enlisted	47**	96	98	78**	92
Officer	60**	89**	93*	88**	64

*Slightly more than 90 days available for contingencies.

**Less than 90 days available for contingencies.

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Because many individuals have little or no noncontingency TDY during the year, the calculations of average days available for contingency on all personnel in the population is biased slightly upward. We recalculated the numbers for those who have at least five days of TDY per year to better reflect TDY availability for those most likely to go TDY. For these individuals, availability for contingency TDY is further reduced within most categories of personnel. Since contingency deployments are normally 90 days in duration, we have marked with single and double asterisks those categories of personnel that could barely support or would not be able to support a 90-day contingency TDY without exceeding the goal of 120 days of TDY maximum in a one-year period.

Summary

- **Recorded TDY data are reasonably accurate for force-wide reporting.**
- **Individuals' data are less accurate, and need care in analyses (e.g., retention related to TDY) based on them.**
- **If held to 120-day maximum annual TDY rates:**
 - **Aircrew have perhaps 60 to 75 days available for contingency operations.**
 - **90 days of contingency TDY is the approximate limit available for maintenance, personnel, and security.**

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SUMMARY AND RECOMMENDATIONS

In order to estimate baseline TDY requirements, we had to examine the accuracy of the TDY History File. We discovered that for force-wide reporting purposes, the recorded TDY numbers are reasonably accurate, capturing more than 90 percent of total TDY days. When considered at the individual level, however, the data are much more prone to error and require care in use. Approximately 14 percent of individuals had errors in their recorded contingency TDY, and 29 percent had errors in their recorded noncontingency TDY.

Taking these inaccuracies into account and adjusting for decreased noncontingency TDY owing to increased support for contingency operations, we estimate that baseline TDY requirements will vary from three to ten weeks, depending on the occupation and rank of the individual. Should all of the "required" TDY be performed, we therefore infer that aircrews can support 60 to 75 days of contingency operations per year and that individuals in maintenance, security, and personnel career fields can support as many as 90 days of contingency TDY annually. These levels would still allow for adequate noncontingency TDY within the overall limit of 120 days TDY per year.

Recommendations

- **Improve the TDY tracking system.**
 - **Adopt changes that correct identified sources of error in the TDY tracking system.**
 - **Monitor the accuracy of the tracking system until confidence in the system is achieved.**
- **Consider additional policy alternatives to reduce the burden of TDY for contingency operations.**
 - **Consider assignment policies that would spread the burden of contingency TDY over a greater share of the force.**
 - **Shift force manning into specialties hard-hit by contingency operations.**
 - **Change the limit from 120 days in a trailing 365-day window to 140 days in a trailing 450-day window.**

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Throughout the course of this research, a number of sources of error in the TDY tracking system were uncovered. Perhaps the root of the problems with the tracking system is the system was created by using existing systems without modification. This has meant that systems designed for other purposes have been pressed into service for centrally tracking TDY. As noted in this briefing, the major problems are that (1) not all TDY data are collected, and (2) the data that are collected are not accurately categorized. The Air Force should modify existing systems, where necessary, to address these problems.

With regard to our findings on the burden and pace of TDY, the Air Force could consider alternatives to reducing the burden of increased contingency TDY. First, because so relatively few officers and enlisted personnel were deployed on a contingency TDY, it may be possible to spread the burden more evenly over the force through modifications in assignment policies. Second, to the extent that current levels of contingency operations are becoming the norm, the Air Force could consider changing manning policies to shift increasing numbers of personnel into specialties that now bear the brunt of contingency operations. Finally, as a short-term measure, the Air Force could consider

changing from the current 120-day ceiling out of a trailing window of 365 days to something like a 140-day ceiling out of a trailing window of 450 days.

Appendix A

DATA SOURCES

We used four sources of data for this research: (1) a TDY History File created by AFPC; (2) Air Force personnel files that list assigned personnel by Air Force Specialty Code (AFSC), pay grade, and duty location; (3) interviews with individual Air Force officers and enlisted personnel; and (4) interviews with squadron commanders.

The primary data for this research come from the TDY History File. The TDY History File is created by AFPC from a combination of finance and duty status records. The TDY History File contains a record for each TDY event for each individual. Each record includes name, social security number, duty AFSC, primary AFSC, duty location code, pay grade, TDY start and end dates, and TDY category. TDY categories are created by AFPC and include AFPC's best judgment on the purpose of the TDY event: contingency or other named operation, JCS exercise, MAJCOM/service exercise, or other activity. TDY events are first categorized on the basis of the PID code that is recorded on some travel orders and carried over into the finance system when a travel expense voucher is filed. A PID exists for each contingency or named operation and exercise but not for other TDY activities. AFPC reported that there is much room for error in its categorization of TDY on the basis of these codes; clerical errors or lack of training result in the appropriate PID not always being recorded, or recorded correctly, on the travel order. AFPC cross-checks their initial categorization of each TDY event using the TDY-type code that is recorded in duty-status records in the personnel system. Duty-status records indicate a change in status when an individual leaves on TDY. However, units are not always diligent in updating and maintaining current duty-status records. As a result of errors in both finance and personnel records, the categorization of TDY in the TDY History File is not completely accurate. Using the TDY type codes from the duty status records, we further categorized the TDY History File's "other" category into "school" and "other."

Our second source of data was interviews with 373 officers and airmen. Each interview centered on the accuracy of the individual's TDY record in the TDY History File. Each individual was shown a detailed list of his or her TDY events for the period February 1, 1998, to July 31, 1999. Each interviewee was asked to check the dates and purpose of each event and

to add events if they were missing from the record. No errors were recorded unless the AFPC representative on the interview team was convinced that an error had occurred. Many individuals brought their personal TDY records with them to the interview.

Individuals were not asked whether they had missed noncontingency TDY as the result of having participated in contingency operations.

Our third source of data was uniformed officer and airman strength files. These files record military end strength by pay grade and AFSC. We used these files in estimating both the proportion of personnel that were in our sample and the rates of TDY among officers and airmen; the TDY History File includes records only for those who went on TDY, not for those who did not incur any TDY. We used data from the files for September 1998 in our calculations. This is a snapshot of one point in time but is approximately the midpoint for the time frame on which we focused in this research.

The fourth source of data consisted of notes from interviews with squadron commanders. These semistructured interviews centered on squadrons' overall experience with TDY between June 1998 and May 1999. Commanders were shown average days of TDY by TDY type over the past year for each of four pay-grade groupings in their squadrons: field-grade officers, company-grade officers, enlisted airmen E-5 and above, and enlisted airmen E-4 and below. They were first asked to review the summary data for their squadron. Next, for each category of TDY for each of the four pay-grade groupings, commanders were asked specifically whether any members of their squadrons had missed TDY that they should have performed during the past year. If so, they were asked to estimate the magnitude of the shortage in required TDY. "Required TDY" was defined as the amount of TDY normally necessary to maintain the squadron's readiness.

Appendix B

MODELING AND SAMPLE

MODELING

We modeled TDY reporting through use of a two-stage process:

- We used poststratification weights and nonresponse weights to equate overall levels of official TDY between the sample and the population (i.e., all individuals in the commands and occupations represented) because the sample had significantly higher official overall TDY rates than the population (66 versus 39 total official TDY days, respectively).
- To adjust for errors in recording official TDY days, we built a two-stage model of TDY reporting that predicts actual TDY from official TDY. A two-stage model of TDY reporting was necessary because of the bimodal distribution of errors: Most records were either correct or nearly so, but some were substantially incorrect. Total TDY, contingency TDY, and noncontingency TDY were modeled independently except for maintenance officers, whose total corrected TDY was estimated as the sum of corrected contingency and corrected noncontingency TDY.

For the two-stage model, we first modeled the probability that a record in the TDY tracking file was in error by more than two days. If we predicted that a record was not in error by more than two days, we used the officially recorded TDY as the estimate of actual TDY. If the official record was predicted to be in error, we used our sample to model actual TDY on the basis of official TDY.

For the first model, we estimated a weighted logistic regression:

- **Dependent variable:** 0 if actual and recorded TDY within ± 2 days; 1 otherwise.
- **Right-hand-side variables:** pay grade (officer, enlisted), MAJCOM (PACAF, USAFE, ACC, AMC), occupation (aircrew, maintenance, security, personnel), TDY days (from the AFPC database), quadratic of TDY days.

For the second model, we estimated a weighted linear regression on cases in our sample where actual TDY and official TDY differed by more than two days:

- **Dependent variable:** actual TDY (from interview records).
- **Right-hand-side variables:** pay grade (officer, enlisted), MAJCOM (PACAF, USAFE, ACC, AMC), occupation (aircrew, maintenance, security, personnel), TDY days (from the AFPC database), quadratic of TDY days.

The two-stage model developed on the sample was applied to cases for which we had only official data (i.e., the population, excluding the sample) using the following formula:

$$\text{Estimated (corrected) TDY}^{\dagger} = \text{Pr}(\text{error} < 3 \text{ days})^{\ddagger} * (\text{recorded TDY}) + \text{Pr}(\text{error} > 2 \text{ days})^{\S} * (\text{predicted TDY when error} > 2)^{\diamond}$$

SAMPLE

Sample sizes for the estimation are provided in the table below:

	Enlisted	Officer	Total
Aircrews	9	97	106
Maintenance	105	28	133
Personnel	54	26	80
Security	42	12	54
Total	210	163	373

[†]Out-of-range predictions, which were very uncommon, were set at the minimum (0) or maximum (365) possible values.

[‡]From Stage 1 model.

[§]From Stage 1 model.

[♦]From Stage 2 model.

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